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MINERALOGY AND PETROGRAPHY.[1]

The Geology of the Kaiserstuhlgebirge, by Graeff,[2] contains a resumé of the facts known concerning the structure of this celebrated region, and a brief synopsis of the characteristics of the interesting volcanic rocks occurring there. The tephrites, basanites, phonolites, limburgites, nephelinites and leucites found in dykes and flows in the mountains are described only briefly, as they are all well-known to petrographers. The loess, tufas and the crystallized limestone, the latter of which forms the central portion of the heights, are treated as briefly, except that in relation to the origin of the limestone the author enters upon a discussion to show that it is probably a metamorphosed Jurassic rock. The most interesting portion of the paper is that which describes the inclusions in the eruptives. These are gneiss, granite, eleolite-syenite, and fragments of the volcanic rocks. They have all been more or less altered by the eruptive in which they are imbedded. The wollastonite and melanite crystals, both very common in the phonolite, are thought to be the remnants of metamorphosed limestone fragments. The most striking inclusions are those found in a phonolite dyke near Obenbergen. They are often coarsely granular, and sometimes have rounded outlines. Their mineral constituents are the same as those of the including phonolite; but usually some one or more of them is completely lacking. Orthoclase, hauyne and nepheline are the most abundant components, and hauyne the most persistent, entire inclusions sometimes consisting almost wholly of large idiomorphic hauyne crystals. Graeff supposes them to be the cooled intratellurial portions of the magma, which on the surface yielded phonolite, that, after solidification, were brought to the surface by a second eruption of the same material. He believes the olivine bombs in basalts have an analogous origin, and that they are not simply concretions of the basic minerals of this rock.

A Cyanite-Garnet-Granulite from the Tirolese Alps.—This rock, obtained some time ago by Cathrein, has been examined microscopically by Ploner.[3] The garnet and cyanite are both in large grains, the former in dodecahedral crystals that have in many instances been shattered by pressure, and the latter in bent plates with the usual features of cyanite. Biotite encircles both of these minerals, notably the garnet, as a sort of zone. The groundmass in which these components lie is an aggregate of oligoclase, orthoclase and quartz, sometimes the monoclinic and at other times the triclinic feldspar predominating. Rutile is present in the rock as inclusions in the garnet, the cyanite and the biotite, as an alteration product of the mica, and as crystals in the quartz-feldspar aggregate. Muscovite, ilmenite, zircon and leucoxene are also present in small quantities.

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Mitth. der Gross Badischen Geol., Landesanst 2, xiv, p. 405.

[3] Min. u. Petrog., Mitth. xii, p. 313.

Tufaceous Slates from Wales.—Among the sedimentary roofing slates of North Wales Hutchings[4] finds some that appear to be composed principally of andesitic and rhyolitic ash, consisting of fragments of lapilli, of feldspar and of sedimentary rocks imbedded in a paste of chlorite, small rods of sericite and minute grains of garnet, besides a little quartz and calcite. The most essential differences between these slates and those of sedimentary origin are with respect to their titanium constituents; in the ashes sphene and anatase being the most important, and in the true slates the so-called "slate-needles." These latter are thought by the author to occur only as decomposition products of biotite, and to be limited in their occurrence to water deposited fragmentals. The feldspar in the rocks under discussion are changed to white mica, chlorite and calcite. Secondary orthoclase and plagioclase often coat tiny cavities in the rock.

Alteration Products of Diabase from Friedensdorf.—The clefts in the diabase of Friedensdorf, near Marburg, are covered with little crystals of albite, analcite, natrolite, prehnite and calcite, all of which minerals occur also in the body of the rock. According to Brauns[5] they are decomposition products of the diabase plagioclase, and are due to the action of water containing carbon-dioxide upon this feldspar. Microscopic sections show the original plagioclase surrounded by fresh albite and filled with little nests of the other secondary substances mentioned. The process of the alteration is outlined by the author, who also shows the chemical relations existing between the new substances and the material from which they were derived. The diabase originally contained in addition to the plagioclase, both monoclinic and orthorhombic pyroxenes, olivine and titanic magnetite.

[4] Geol. Magazine, 3, ix, 1892, pp. 145–335.

[5] Neues. Jahrb. f. Min., etc., 1892, ii, p. 1.

The olivine and the orthorhombic pyroxene are serpentinized and the plagioclase altered as already indicated.

Camptonite Dykes in Maine.—In the gneiss of Androscoggin County, Maine, especially in the vicinity of Lewiston and Auburn, are a number of small dykes, some of which are of normal diabase, while others consist of camptonites. Olivine is abundant in several of the latter, and in such large grains as to be readily detected in the hand specimen. Olivine and augite are frequently in phenocrysts, while the last named mineral, hornblende and plagioclase make up the large part of the groundmass of the lamprophyres. An analysis of material from one of the dykes yielded Merrill and Packard :[6]

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	K_2O	Na_2O	P_2O_5	CO_2	H_2O
39.32	1.70	14.48	2.01	8.73	.71	8.30	11.11	.87	3.76	.61	5.25	2.57

Predazzites and Pencatites.—Twenty specimens of predazzites and pencatites from various localities have been examined by Lenecek[7] in order to determine whether the rocks contain brucite or not. The sections of the true predazzites were found to have a calcite groundmass, scattered through which are fibres of hydromagnesite, supposed to be pseudomorphs after periclase, since cross sections of groups of fibres have a regular outline, and since one section of pencatite from Canzacoli shows periclase crystals more or less changed to serpentine. The dark pencatites differ from the predazzites in containing a large quantity of marcasite, to whose opacity the dark color of the rock is due. Besides the constituents already mentioned there are in both rocks many small grains of colorless silicates that may be pyroxenes, amphibole and olivine. Serpentine veins also cut both rocks, and brucite plates are not uncommon as the lining of little cracks.

Petrographical News.—Around the granite boss of Cima d'Asta, as around the other eruptive masses of eastern South Tyrol, there are abundant evidences of contact action in the contiguous sedimentaries, the contact rocks being not different in their essential characteristics from those surrounding the Adamello tonalite. The tonalite gneiss of the Adamello region is a pressure gneiss, occurring along lines, which were the slipping directions in the eruptive.[8]

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[6] Am. Geol., x, 1892, p. 49.

[7] Min. u. Petrog. Mitth., xii, p. 429.

[8] Sdlomon. Min. u. Petrog., Mitth. xii, p. 408.

At last Rosenbusch[9] has replied to Michel Levy's criticism of his classification of massive rocks. In this reply the author first corrects some misstatements made in Levy's brochure, and then discusses the questions of priority which the French savant raises. After effectually disposing of these points Rosenbusch gives the reasons that led him to suggest the separation of massive rocks into the three classes, the plutonic, the volcanic, and the dyke rocks, and states that the recent work of all petrographers has strengthened his determination to hold to this classification.

The granite, porphyry, schist and clastic rock boulders occurring in the various conglomerates and breccias of the "Flysch" in Switzerland have been thoroughly studied by Sarasin,[10] who recognizes among them many that are identical in substance with rocks in the Southern Alps. This fact leads him to suggest that the middle Alps were not elevated to anything like their present height at the time when the conglomerates and breccias were formed, but that there was then an unimpeded course from the Southern Alps to the northern side of the Northern Alpine ranges.

In an article entitled The Geology of the Massive Rocks of the Island of Cyprus, Bergeat[11] describes with very little detail diabase, gabbro, wehrlite, serpentine, andesite, liparite, trachyte, and andesitic and liparitic tufas, all of which occur in some quantity on the Island. All are very much altered.

In a block that fell from the walls of the Legbachthal, Oberpinzgau, in the central Alps, Weinschenk[12] found a small dyke of much altered kersantite. On the contact of the dyke with the intruded biotite feldspar schist the latter is changed to an aggregate of epidote, quartz, feldspar and muscovite.

Hibsch[13] describes from Southern Paraguay a sandstone, a quartz porphyry and a nepheline-basalt.

Josephinite, a New Nickel-Iron Alloy.—*Josephinite*[14] occurs as magnetic pebbles in the placer gravel of a stream in Josephine and Jackson Counties, Oregon. The pebbles consist of a greenish-black siliceous substance intermingled with grayish-white areas of the alloy.

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[9] Ib., xii, p. 351.

[10] Neues. Jahrb. f. Min., etc., B. B. viii, p. 180.

[11] Min. u. Petrog., Mitth. xii, p. 263.

[12] Min. u. Petrog., Mitth. xii, p. 328.

[13] Ib., xii, p. 253.

[14] Amer. Jour. Sci., June, 1892, p. 509.

The siliceous matter is partly serpentine and partly a silicate, insoluble in acid, possibly an impure bronzite. The alloy has a composition corresponding to $Fe_2\ Ni_5$. Chromite, magnetite and troilite are also present in the pebbles, the first two as granules in the silicates. The alloy is gray, malleable and sectile, and has a hardness of 5. Its origin is probably terrestrial.

Crystallography.—On crystals of *vesuvianite* from the blocks of Monte Somma, Boecker[15] finds seven new forms and recognizes a tabular type hitherto undescribed. The new forms detected are $\frac{1}{6}P\infty$, $\frac{2}{9}P$, $\frac{5}{2}P$, $\frac{5}{14}P$, $\frac{5}{18}P\frac{5}{18}$, $\frac{2}{7}P\frac{2}{7}$, and $\frac{11}{4}P\frac{11}{4}$. He describes also transparent green crystals of the same substance implanted in granular yellowish-green vesuvianite from Lermatt.

On *topaz* from near Miass in the Ilmen Mountains, S. Urals, Souheur[16] reports a large number of new planes in the prismatic and the pyramidal zones, and that between $P\bar{\infty}$ and $\frac{1}{2}P$. The crystals are from Redikorzew's topaz mine, where they are associated with ilmenorutile, black tourmaline, and muscovite on an amazonite-bearing granite.

The plane $P\breve{2}$ has been discovered by Pelikan[17] in *sulphur* crystals, implanted on antimonite from Allchar, Macedonia. Measurements of cleavage pieces of meteoric iron incline Linck[18] to the belief that the twinning of the iron is parallel to the plane 2O2.

Mineralogical Notes.—Another calculation of the formula of *tourmaline* from published analyses leads to the suggestion by Kenngott[18] that the various members of the tourmaline group are isomorphous mixtures of the compounds $3R_2O.\ SiO_2 + 5\ (R_2O_3.\ SiO_2)$ and $2\ (3RO.\ SiO_2) + R_2O_3,\ SiO_2$, The red tourmaline from Rumford, Me., may be regarded as the first end member of the series. The last end member is not yet known.

New analyses of *pseudobrookite*[19] from the Siebenbürgen yield no magnesia. Crystals from this locality, like those from Norway, thus consist simply of iron and titanium oxides. They are tabular with $\infty P\bar{\infty}$, $\infty P\breve{\infty}$, $\infty P\bar{2}$, ∞P, $P\bar{\infty}$, $\frac{1}{3}P\breve{\infty}$ and $\frac{7}{2}P$, of which the latter is

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[15] Zeits. f. Kryst., xx, p. 225.

[16] Zeits. f. Kryst., xx, 1892, p. 232.

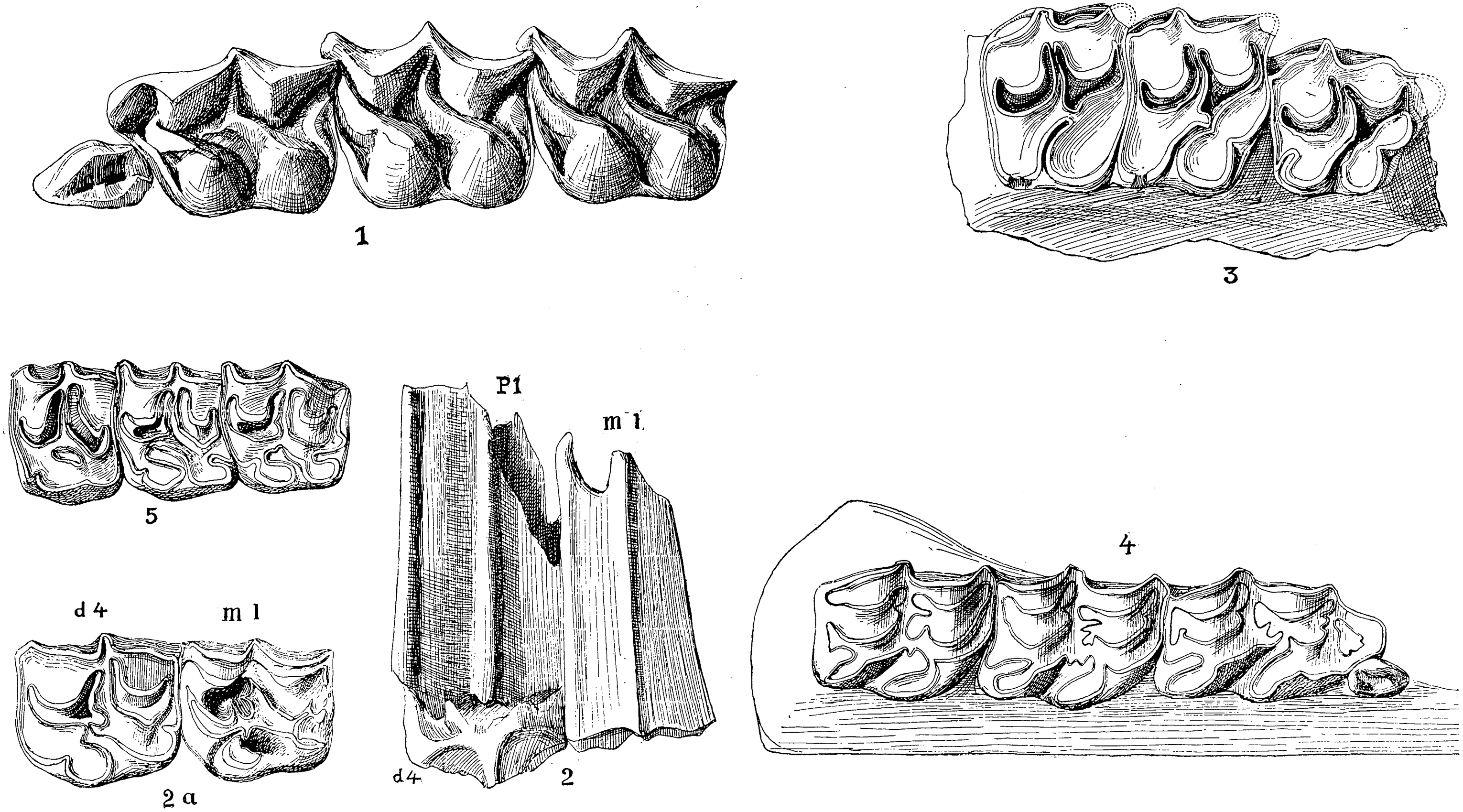
[17] Min. u. Petrog., Mitth., xii, p. 344.

[17] Zeits. f. Kryst., xx, p. 209.

[18] Neues. Jahrb. f. Min., etc., 1892, ii, p. 44.

[19] Traube. Zeits. f. Kryst., xx, 1892, p. 327.

PLATE XXVI.



Dentition of three-toed colts.

new. Their axial ratio is .98123 : 1 : 1.12679. The mineral is found in clefts of an andesite, or in the rock mass in the neighborhood of inclusions of quartz and augite.

In his Notes on Some Minerals of the Fichtelgebirge, Sandberger[20] gives analyses of *titanic iron* sand from the banks of the Eger, of *rhodonite* from Arzberg, of the *margarodite* covering orthoclase crystals in the druses of the lithionite granite of Epprechtstein, of the *chlorite* pseudomorphs of orthoclase crystals in the dolomite of Strehlenberg, and of a *lithium mica* from Fröstau, near Wunsiedel. The last named mineral is one of the constituents of a rock whose only other original component is white albite. Its analysis gave:

SiO_2	F	Al_2O_3	Fe_2O_3	MnO	MgO	K_2O	Na_2O	Li_2O	H_2O
50.11	1.36	1.36	1.01	1.01	.96	10.51	1.58	1.43	1.91

besides small amounts of TiO_2, SnO_2, FeO, CaO, CuO, As, Sb, Pb, Co, and B. The author thinks that there are certainly five distinct lithium micas known.

Katzer[21] mentions the occurrence of *arsenopyrite* and *quartz* crystals at Petrowitz, in Bohemia, of *sphalerite* and other sulphides, and of *siderite* at Heraletz, of *wollastonite* in fibrous masses on the contact of limestone with granite-gneiss, and of crystals of blue *cordierite* at Humpoletz, of andalusite at Cejod, of a calciferous *tourmaline* at Benitz, and of *gypsum* crystals at several localities in the same Kingdom. The tourmaline analyses gave:

SiO_2	Al_2O_3	B_2O_3	FeO	Fe_2O_3	MnO	CaO	MgO	Na_2O	K_2O	F	H_2O
35.53	30.73	5.59	5.67	7.67	1.17	3.16	2.82	4.38	.63	.12	2.86

Crystals of *epsomite* are described by Milch[22] from Stassfurt-Leopoldshall, Germany. They are implanted on a granular halite or a saliferous clay, and reach in many cases several centimeters in dimensions. They are all columnar in habit, and are remarkable for their richness in planes and for the marked character of their hemihedrism. The principal forms occurring in them are $\infty P\bar{\infty}$, $\infty P\underset{\infty}{\smile}$, ∞P, $\infty P\bar{2}$, $\infty P\breve{2}$, $P\bar{\infty}$, and $2P\bar{\infty}$.

Several rough, twinned crystals of *alabandite* from a deposit of the mineral in the Lucky Cuss Mine, Tombstone, Arizona, have been analyzed by Messrs. Moses and Luquer.[23] The mineral is of a dark, lead-gray color, with a brownish tarnish. *Wavellite* from the Dunellen Phosphate Mine, Marion Co., Fla., contains $Al_2O_3 = 37.076\%$, $P_2O_5 = 33.887\%$, and $H_2O = 26.366\%$.

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[20] Neues. Jahrb., f. Min., etc., 1892, ii, p. 37.

[21] Min. u. Petrog., Mitth, xii, p. 416.

[22] Zeits. f. Kryst., xx, p. 221.

Zincite crystals from Sterling, N. J., have again been analyzed. Grosser[24] finds in them $ZnO = 96.20$; $MnO = 6.33$; $Fe_2O_3 = .43$.

New Instruments.—A new signal for use in goniometrical measurements has been introduced to the notice of crystallographers by Goldschmidt,[25] which, it is believed, has several advantages over the Websky signal. A new adjusting apparatus for the goniometer has also been devised by the same crystallographer. It consists of an arm movable in four or five directions. By its use all the zones in a small crystal may be measured without the necessity of imbedding the crystal in wax more than once. A cheap heating apparatus to be used with the microscope has been constructed by Schrauf.[26] It is essentially a little box of a non-inflammable, poorly conducting material that is heated directly by a gas burner.

Staske[27] uses a very simple instrument for the production of curves of heat conductivity on mineral plates. It comprises a copper wire heated at one end and at the other touching the mineral slice, coated with paraffine.

Miscellaneous Notes.—Another investigation to determine the solubility of minerals in water under pressure, in the presence and absence of carbon-dioxide, has been made by Binder.[28] He finds that at 90° *bornite, chalcocite, marcasite, manganite* and *fluorite* are dissolved to an appreciable extent in pure water, and *cinnabar, cuprite,* and *pleonaste* to a slight degree only. When CO_2 is added to the solvent, *pyromorphite* dissolves, and *epidote* in small amounts. Under the same conditions *andalusite* and *anorthite* are decomposed.

The U. S. National Museum has issued a handbook of Geognosy, dealing with the materials forming the earth's crust. In it Mr. Merrill[29] outlines the characteristics of the aqueous, æolian, metamorphic and igneous rocks, and then describes briefly the principal members of each class. The little book is well illustrated, and its contents are conveniently arranged for the student of the museum's collections.

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[23] School of Mines Quarterly, No. 3, xiii, p. 237.

[24] Zeits. f. Kryst., 1892, xx, p. 354.

[25] Zeits. f. Kryst., xx, 1892, p. 344.

[26] Ib., xx, 1892, p. 363.

[27] Ib., xx, p. 216.

[28] Min. u. Petrog., Mitth. xii, p. 332

[29] Rep. of Nat. Mus. for 1890, p. 503.

All of the natural manganese oxides except pyrolusite and manganite yield red or violet solutions when digested with a mixture of sulphuric acid and water in equal proportions.[30]

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[30] Thaddeef. Zeits. f. Kryst., xx, 1892, p. 348.